Mechelectiv

VOL. 18 NOVEMBER, 1959 NO. 2

THE GEORGE WASHINGTON UNIVERSITY · SCHOOL OF ENGINEERING ·

NOVEMBER 1959

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Orbiting space laboratories.

NASA National Aeronautics and Space Administration

The Mechelectiv

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ARTICLES

DEPARTMENTS

ON THE COVER:

Workers erecting corner reflector antennas in Page-designed and installed scatter-communications system in the Pacific Ocean area.

FRONTISPIECE:

A view of the Engineering School office, with the girls hard at work.

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SLEEPING GIANT

The engineering school here at GWU could be the strongest force in student affairs if it so decided. Last year this was proved when the three candidates of the Engineering School for Homecoming Queen were elected finalists by an overwhelming vote, causing the Homecoming Committee to change the method of selection of the queen. This year the judges chose the finalists, and the students voted for the queen rather than the reverse, as was done last year.

But the students of the Engineering School seem to ignore the rest of the University, leaving the election of the Student Government Officers to the Greeks, and Art students. Only 10% of the Engineering students bothered to vote for Student Council Representative last spring. Is this isolation good for either the students or the University? We don't know. But there is a need for the technical knowledge stored in Tompkins Hall. The radio station has asked the IRE to supply engineers to run the transmitter (the Engineers designed and built it).

The other side of the campus seems to be ignoring the Engineering School too. That the Hatchet was not distributed to the School of Engineering prompted an exchange of letters from Dean Mason to the faculty advisor of the University Hatchet. The result of this exchange was that a few small piles of Hatchets appeared in the lobby of TH. They are still there.

That the Engineering School could exert pressure on the rest of the school is apparent from the Homecoming Queen Caper. That they don't is apparent from the Hatchet Case.

The strongest case for mixing with the rest of the school is: There are girls over there.

A FORMULA FOR SUCCESS

by BOB MOORE

This is the story of a successful man. A man who early in life found a method for living and prospering in the highly-complicated modern world. His idea was simple. He reasoned that although the material and social aspects of the world have undergone vast changes, people have remained basically the same. Therefore, he carried out extensive research on the characteristics of the great men of all ages. He then compiled a cross index of these qualities. From this he was able to determine what qualities these great men had in common.

When he finished his project, he found that the great men of all ages had the following qualities in common. They were all 100% for God, Mother, and Country; and they were all 100% against Sin. In addition, he found that they were for Progress, but against Change. Thus, he had his formula for success! Now he had to determine how and where to apply it.

His problem was rather complex. He was a man with no skills, about average intelligence, and no particular abilities of leadership or initiative. Therefore, he had to find a profession in which his natural qualities, combined with the qualities which he had found to mark great men, would lead him up the bright ladder of success. He had to find a profession in which a man who knew nothing could prosper.

After considerable thought, he found the solution to his problem. It was so simple and obvious that he was amazed he had not thought of it sooner. He would become a politician! It was perfect! Nothing could be better—especially in these times of rapidly-changing technology, when everyone is confused about the state of the world.

In such circumstances he felt that his entrance into the political arena was especially timely. He was coming into the game with a perfectly uncluttered mind; with no preconceived notions or prejudices. He could thus approach the problems of the world from a truly objective point of view.

There is really no point in telling the rest of this story. Of course he was elected to every office he sought. Who could successfully oppose him? If you were against him you were against God, Mother, and Country; and for Sin. You were against Progress; but for Change. Who could hope to win on such a platform?

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Globetrotting Engineers

by STANLEY TULL

(Ed. note: Since entering GWU in the fall of 1956, Stan Tull has travelled more than 27,000 miles during the summer, engaged in work in the communications field. We asked Stan if he enjoyed his experience this past summer, and how he feels about field engineering in general. The following is his answer.)

Do you ever get tired of the same old routine, the same scenery, the same job, day after day? Have you ever wished you could step aboard a plush airplane and fly to the lovely South Pacific, romp with the natives, play on white sand beaches, and at the same time pursue a career? Well, for an engineer who has a bit of the pioneering spirit and is not afraid to take life as it comes, such events could become commonplace by electing the life of a field engineer.

Fortunately for me, I became associated with Page Communications Engineers, Inc., a company which specializes in world-wide communications systems, before I started at GWU. The summer jobs they have given me have been lucrative as well as educational, and have made for me the decision of what to do after graduation. Whether toasting the Queen in a Canadian Officers' club in northern Canada, admiring the female bicyclists in Copenhagen, playing cards with Eskimos in a tent atop a mountain in eastern Greenland, or more recently, learning to sail a "Kapingi-Marengi Sail Canoe" in the South Pacific, I have always found time to reflect on how lucky I was in not being tied down to a nine-to-five office job.

Most of the large engineering firms maintain a staff of field personnel. Many of them find difficulty in locating enough good men for the jobs. Engineers are afraid they will be "stuck" in some place they don't like, are reluctant to leave old friends and surroundings, or fear they may have to leave their wives behind. Admittedly, there are many unpleasant places on this globe, but an engineer is not expected to remain at these places for any extended time. And it is quite possible for him to work himself into a more-or-less permanent position at some choice location as in Europe or South America. Most companies today make arrangements for the wife to travel with her husband if his overseas stay is to be prolonged. I might mention here that a considerable proportion of my friends in the field have foreign wives. (Apple pie is delicious, but a tour of bakeries often creates a taste for éclairs.)

As for the work involved, the field engineer may be engaged in installation, testing, and operation of equipment —usually in a supervisory capacity—and concurrent with these duties, a certain amount of liaison activity with the customer. Communications with the home office are often slow and the field man must be able to improvise.

By working with new systems in their tuneup and initial operation stage, he is in an excellent position to observe design defects and make recommendations for improvements, an activity which is greatly encouraged by the home office. As a simple example, suppose that in field testing a new device it develops that one of its tubes fails repeatedly. His investigation must determine whether these failures were caused by improper operation of the equipment or through design error. In short, he must know as much about the

individual components as the designer in addition to having a complete knowledge of the system as a whole.

He must be able to teach others. After a new system is installed and working properly, the engineer often leaves for a new assignment. He must be sure that those remaining behind as operators are fully capable and are aware of the peculiarities of an individual system.

A good bit of his time is spent in preparing reports for the company. The home office usually takes the attitude that the more heard from the field, the better. Only in this way can a far-flung operation be successfully managed. But these reports are important also to the engineer, for they give management a continuous record as to the ability and effectiveness of the field engineer. In the case where an engineer is required to divide his time between several sites,

he automatically becomes something of an administrator and his value to the company increases. It is easy to see that an engineer who has a good overall knowledge of the problems and functioning of each of the sites in a missile tracking range, for example, would be better in line for promotion than the man who designed the IF strip of one of the receivers used at the sites.

The above discussion may be too general for some readers and so here I would like to give a brief description of my most recent assignment for Page Engineers. Unfortunately, I am prevented from being specific in any technical discussion of the work because of security restrictions.

Page, under contract to the Army Signal Corps, has designed and built an ionospheric-scatter multi-channel radio communications system which extends from the Hawaiian Islands to Okinawa. It is the world's largest scatter communications system. Late last May, I left Washington for Ponape, a lush, green island in the East Caroline Group and a link in the system. There was a layover in Honolulu, where the stewardess was kind enough to accompany me on a revisit to the favorite haunts of my service days in the islands. After a swim the following morning at Waikiki, I flew to Wake, where I was met by a Page man, an old friend whom I had not seen in two years and who had until recently been working out of Paris. We had an hour's chat while the plane was being refueled and then it was on to Guam where I was again met, though it was 3 a.m., this time by the Office Manager. Ed made me feel at home and installed me in a room. I had several days to wait for the weekly flight to Ponape, and so I went out to the station which was being built there at Guam to learn what I could of some of the new equipment from the installation supervisor. Though I had had previous experience at sites of this type, many refinements had been made since I last worked with this equipment and there was a good bit to learn. The layover also gave me a chance to become accustomed to the tropics before heading south.

The following Monday, the ninth day after leaving Washington, was again spent in flight and that evening we sat down in a smooth water landing on the beautiful lagoon which serves as the airport for Ponape. A short boat trip, and I was met by many more company people, some faces familiar and some not. After the formalities, we settled down for a cooling drink at the only bar in town, which was in the only hotel on the island. Tourists are not allowed in Ponape, which is true of many of the Trust Territories. The administrators of the Territories feel that the natives are not yet ready for them, which is perhaps evidenced by the female Ponapean's fascinating trait of going about bare-breasted.

Two very good friends were among my co-workers there: Carl, a senior installation supervisor, had worked beside me in my pre-college days, and with Stan, a recent graduate of Maryland University, I had weathered some memorable fraternity parties as well as an unseasonably cold September in Thule.

A small but comfortable room was assigned to me. The evening meal was T-bone steak, as many as I liked. I was told that I could pile my dirty clothes in the corner of my room in the morning and they would be returned, washed and ironed, in the evening by "Washee", the camp laundry boy. A jeep was assigned to Stan and me. The evenings

50-ft. paraboloidal dish used to test propagation attenuation over a path in the far north. The writer was part of a ten-man team which spent 3 months at this site. The tent in the foreground served as the hospital.

were cool, the days balmy, my evenings free. This was to be a fabulous summer—now let's see to the work.

Most of the equipment was installed and connected, and now needed only to be tuned up, and performance checks made. Shortly after I arrived, our chief engineer flew in to do some preliminary work on one of the new transmitters. I had the good fortune to work with him for two weeks and learn some of the tricks of the trade that come from many years of experience in radio engineering. The equipment had had a long journey from the factory and it was natural that troubles would develop which were not apparent with the pre-tuneup visual inspection. In addition, these transmitters had never before been operated at the frequencies we were using, and so we kept good records and passed the information we picked up on to other stations. The station had a complicated array of antennas and transmission lines. Part of my time was spent in assisting Stan in cutting and pruning lines, using an admittance meter and Smith Chart.

In the evening, my friends took me to "town" to see the sights. Their fraternal regard for me was never more apparent than when they introduced me to Kalena, a graceful, exotic creature, who was half Polynesian and half Micronesian. We became great friends. I had been briefed before leaving the home office on the customs of the natives. In fact, I was required to sign a document testifying that I had read and understood these customs. As I recall, the only things that seemed strange to me were the warnings that it was considered impolite to touch the head of a native, and that a native, out of politeness, would always say "yes" to any yes-or-no question. This last fact had as its importance, not, as you might suppose, in dealings with the female element; but rather when supervising natives at work. You might explain a job to a native laborer, ask him if he was sure he understood what he was expected to do, and even though he didn't have the foggiest notion of what he was to do, he would reply in the affirmative. This, they say, takes a little getting used to and then you avoid yes-or-no questions.

There was a fair amount of social life among the few Americans, Europeans, and Japanese living in Ponape. We had parties and dances, and there were movies, and every Sunday we took a boatride. We had a first-rate cook, and the food was excellent. For coffee-breaks there were bowls of fresh pineapples, bananas and other delicacies which the natives brought in. There was the danger of getting fat.

I was just settling down to an idyllic summer; a couple of us were learning to handle an outrigger sail-canoe, and I was even picking up a few words of the language, when a message came in saying that I was needed in the Philippines as soon as it was practicable for me to leave Ponape. Ten days later I was enroute back to Guam. I was looking forward to revisiting the Philippines as I had made several very pleasant trips there while in the service. But the company's plans changed again and I was kept at Guam for most of the remainder of the summer. The work there was identical to that at Ponape. The social life, however, was quite different. There were buffets and charcoal broiled steaks eaten at the officers clubs; swing bands and Monte Carlo night; but I longed for Ponape.

View showing coaxial transmission lines running from the communications building to the antenna (background). These cables are kept under pressure to prevent moisture formation. Transmit and receive signals are carried on the same lines though the difference in power levels is considerable. Cables over one thousand feet in length must be cut within an accuracy of one inch.

Soon we were into September and it was time to return to School. But first I took a short vacation at Waikiki. Of course my hotel had a pool and its share of lovely "Wahinis" and all the other accouterments to be found in hotels in that paradise. Martin Denny was at Don The Beachcombers, the weather was perfect, and there was a shortage of males. But all good things must come to an end, and so it was that I returned to Washington on September 15th, put away my bathing trunks, and reluctantly took down from the shelf a dusty book of differential equations.

How do you get into field engineering? A good beginning could be, when filling out a job application form and pondering the question, "Location desired?", to write "as job dictates." What employer wouldn't be pleased to see a prospective employee ready to travel where and when

(Continued on page 29)

Problem: To Build A Swimming Pool

by FRANK NARR

So you think that all you need do to have a swimming pool is gouge a hole in the earth, dump in some concrete, follow it up with water and garnish with lovely bathing beauties? Well, it's a lot more than that, but having a pool certainly has compensations—besides the scantily-clad beauties, that is.

After all, owning and operating a swimming pool is cheaper than buying and running an automobile. And a pool never changes models. Besides, it adds greatly to the value of your home.

What do you have to do first? Well, make up your mind where you want to locate the pool. You should go over the backyard and drive a few stakes. Dream how nice it would be to take a plunge in that refreshing aqua-colored water. Now you're sold, but where do you get a good contractor and what is the cost of the pool?

Contact a pool architect, found in any telephone book, and give him your ideas. Then, when your pool is planned and on paper, call several pool contractors and have them bid on the same type of construction.

It's this general way in which all swimming pools are conceived. Now, here's the story of the building of a community pool, constructed by Moeller Air Compressor Service, Inc., of Washington, in the summer of 1958: It'll help disabuse you of the notion that you gouge a hole, dump in concrete, etc.

The site is on MacArthur Boulevard and Walhounding Road. Because aqueducts and conduits which carry Washington's water supply lie underneath MacArthur Boulevard, a road limit of 6 tons is in effect. This hampered us in delivery of machinery and material and required construction of a secondary road from Walhounding Road to the pool site.

The terrain here is very hilly with many deep ravines. The land was covered with poplar and oak trees well over 80 feet tall. The pool itself was to sit on a hill-top site that had to be cut approximately 20 feet.

The first task was to clear the land. The trees were cut by portable gasoline saws and then sawed into usable lengths for shipment to a sawmill. An Ensley Backhoe was used to grub out all stumps and an Allis-Chalmers H-D 9 front-end loader was used to gather all stumps to one area for disposal in one of several ravines.

At this time, two test pits were dug to determine the amount of rock that would be encountered in the 20-foot cut. The most resistance met at these points was hard sandstone.

With this in mind two G-M Euclied road pans were used to cut this hillside and at the same time backfill the ravine along MacArthur Boulevard for the future parking lot.

After completing the 20 foot cut, we used a Lima backhoe to begin actual excavation of the pool. During this time we ran into hard solid rock; there was nothing else to do but dynamite!

Holes had to be drilled in the rock with rock drills. hollow drill steels, and rock bits. The rock bits are attached to the drill steels and the steels are inserted into the rock drills. The steels are hollow so rock chips in the drilled hole may be blown out with compressed air. The rock drills are connected to the compressor truck with an

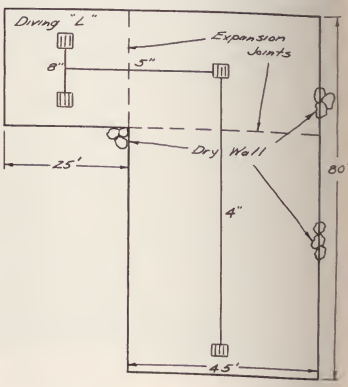


Figure 1—Plan of pool showing location of drain system and size of piping used.

This panoramic view shows how the pool was literally carved out of the side of the hill. The steepness of the slope can be noted by comparing the six-foot editor balancing on the side of the ravine. The car is parked in front of the entrance to the filter house which is located below the decking of the pool. Over 5,000 cubic yards of earth were moved during the construction of the pool.

air hose. The holes are drilled usually one or two feet deeper than the excavation to be done by dynamiting. In spots we had as many as 32 holes with 2 dynamite sticks in each hole. The sticks were connected by small wire leads, with two main leads connected to a 28-volt battery in a plunger box. For safety purposes a rope mat was laid over the area to be dynamited. Then, blast away! We blasted five times.

Our backhoe resumed work, but another problem arose. As loose rocks were taken out, the rough walls gave way since the rocks were jarred loose by the blasting. As we tried to reach the desired depth, our attempts were foiled again. We were going too deep because of the large size of loose rock in the pool subfloor.

After the rough excavation had been completed, an Allis-Chalmers H-D 6 front-end loader was brought in for the fine grading of the pool subfloor. Of course, surveying was required to obtain desired grades.

Once the desired grade of the pool bottom was obtained, work was started on shaping the walls. Because of the immense size of the pool (80 by 70 feet), the earth strata changed often and abruptly. Right through the center of our pool was the rock bed.

Shaping of walls was done by a special crew. This work was done by hand, using picks and shovels. This is required for uniformity in all walls.

Now we were ready for the construction of the beam. The beam is a guide for the exact level or height of the pool. It is constructed around the entire perimeter of the pool at the top.

The beam is made of 2 x 4's fitted together in the manner shown in the perspective drawing. The proper height or grade for leveling these 2 x 4's was obtained by using a leveling instrument.

With most of the work completed, the main drains in the pool sub floor were laid. Cast iron piping was used; 4″ to 5″ to 8″ in diameter as indicated in Figure 1.

Our diameter increase in pipe was to allow for the greater volume of water in deeper points.

In some places dry walls had to be constructed. Dry walls are stones merely piled on each other, using no cement or binding substance. This wall will then serve as a base on which gunite may be blown. It serves as well as the clay-shaped walls as a sturdy support.

The next task was to lay steel on the pool floor. No. 3 rod was used on the pool floor up to the diving L and on the floor of the diving L itself, No. 4 rod was used. The No. 3 rod was laid 12″ apart while the No. 4 rod was laid 8″ apart. The number in the description of the rod is placed over 8 for the diameter of the rod. For example, No. 3 rod is $\frac{3}{8}$″ in diameter and so on for every number.

The expansion joints in the floor were installed next.

The copper strips are bought in sheets 6 feet in length. To make a continuous sheet for the length of the joint, the ends are soldered together. Then, 2 x 4's are placed under the copper sheets for support and are removed when the concrete flooring is poured. In the underside of the "V", tar expansion joint material (used in sidewalks) is placed. The copper, together with the tar joint, is placed on top of the specially-made expansion joint footing which had been previously painted with a non-binding compound. This compound enables the concrete floor to move over the footing without binding in the event of stress or strain. Heat and cold, we all know, cause expansion and contraction. Therefore, a tar expansion joint is used in this way so the inverted copper "V" can expand or contract. The shape of the copper sheet has a definite purpose; it is to prevent

water from seeping beneath the concrete flooring. This joint lies not only along the floor, but also extends up on the sides of the pool.

The concrete floor could now be poured on to the joints. The specifications called for seven days of "curing." Curing constitutes covering the newly-poured cement with burlap and keeping it wet.

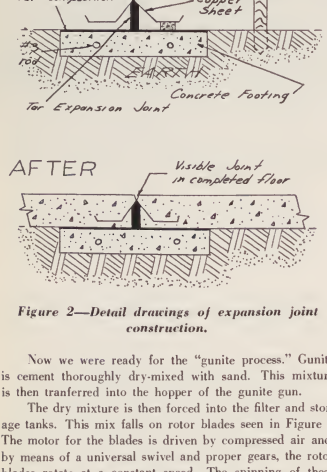


Figure 2—Detail drawings of expansion joint construction.

Now we were ready for the "gunite process." Gunite is cement thoroughly dry-mixed with sand. This mixture is then tranferred into the hopper of the gunite gun.

The dry mixture is then forced into the filter and storage tanks. This mix falls on rotor blades seen in Figure 3 The motor for the blades is driven by compressed air and, by means of a universal swivel and proper gears, the rotor blades rotate at a constant speed. The spinning of these blades forces the gunite mix through the hose with a tremendous speed. Water is added at the nozzle of the hose and is regulated by a manual valve.

The nozzle man can determine the amout of water to be used by watching the consistency of the gunite as it hits the wall. If the gunite tends to "run" after having been blown onto the wall, too much water has been added. One great problem of this process is "rebound." Rebound is the cement and sand that does not stick to the wall. This is usually waste and the degree of this waste depends on the experience of the nozzle man. We had about a 20% waste, which is fairly reasonable. After the gunite has set, a finish coat is applied. This is fine building sand with cement and is troweled to a smooth finish.

Another point about gunite is the process of mixing the dry mixture. One way is using transient-mix, that is, using washed sand with cement and mixing in cement-mixer enroute to the job site. This mix is not too desirable because of the moisture content of the sand. If the moisture content of the sand is above 7% the gunite must be dried, otherwise, water will be drawn out to leave pores in the hard wall. This invites cracking when the rainy season sets in followed by extreme changes in temperature.

The second method of obtaining mix is to mix on the site itself. Here one may order the sand with proper moisture content. Control of the moisture content of the sand in guniting is one of the keys to success in this process.

During the guniting process, light ducts had to be installed. Capped copper tubing, serving as electrical conduits, is extended down from the beam level to the boxed forms for the light assembly. Then the box is gunited. An iron ring is then embossed in the soft gunite and the required hole is dug out until the bottom end of the conduit is reached.

Our next project was planning and laying out of the filter house.

The return water from the main drain enters the tank at the top, travels through the gravel and out the bottom, back into the distributing line.

The tanks themselves sit on a concrete cradle footing.

The overall length of the tanks was 13′ and the diameter about 8′. The filter house walls were constructed of

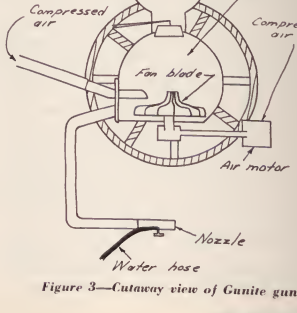


Figure 3—Cutaway view of Gunite gun.

Before and After views of pool site.

Nozzle men at work. His control of the water content of the gunite is critical—too much and it won't stick properly; too little and waste is very high.

8″ cinder blocks. The roof (part of the deck) and supporting pillars were reinforced concrete.

Finally, two rows of tile were set around the top of the pool, followed by coping (connected to the scum gutter).

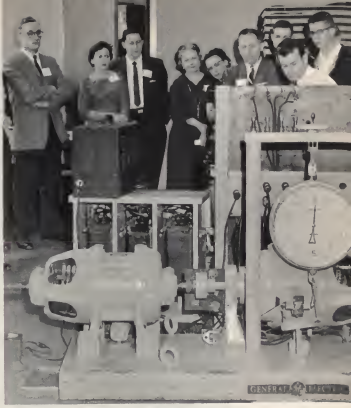
Then the entire deck was poured and the pool was ready to be filled with water.

The construction of the swimming pool was a real engineering feat. Over 5,000 cubic yards of earth had to be moved, much of it being used as fill for the parking area. The problems facing the builders of the pool were many and varied, but when they go for a dip in the hot summer months, they agree that it was worth it.

ENGINEERING SCHOOL FAMILY DAY

Family Day was held October 31 this year. Its purpose was to allow the students to bring their families to the Engineering School so they could be shown the lab facilities and be introduced to the faculty. The parents, wives and children of the Engineering students were greeted by a talk by Dean Mason, and the members of the faculty were introduced by Prof. Ames in his own inimitable way. Dean Mason explained, among other things, why the tuition continues to rise, and compared the academic level of the faculty to that of other schools. Needless to say the comparison was favorable to GWU.

The highlight of the visit, to most of those attending, was the tour of the labs. Members of the Engineers' Council conducted the tours, and demonstrated some of the equipment. Although the turnout was somewhat disappointing, everyone concerned felt that Family Day was a success, and should be continued in the future.



Al Graps, looking like a mad scientists, synchronizes two parallel operated synchronous alternators, in the power lab.

The Healey-Shaw flow table attracts the attention of some of the visitors to the fluid lab. The operation of the apparatus received more attention from the visitors than from most of the students taking Fluid Mechanics.

MECH

A drama stud
lege sparks our Me
name is Kay Bucha
is obvious.

One night d
homecoming show
Hall, pulled costu
and started limbe
happy to pose for
Engineering Schoo

Miss Buchana
Maryville, (Ky.)
student production
here she has dance
YANKEES — The
starred in ANAST

The national
rolled Kay last sp
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Faculty Page

RAYMOND RICHARD FOX, another newcomer, is an associate professor in the School of Engineering. He was born in San Francisco in 1923, but grew up in Seattle, Washington. He received his Bachelor of Science in Civil Engineering and Master of Science in Civil Engineering degrees from the University of Washington, and at Northwestern University has completed his work for a Ph. D. with the exception of the thesis.

Professor Fox's industrial experience includes work with the State of Washington Dept. of Highways Bridge Office where he was employed as a structural engineer in bridge design and at C. F. Braun & Co. of Los Angeles as a structural and foundation engineer. Professor Fox also has worked as a consulting engineer in Seattle and on missile bases for the National Engineering Science Company.

Professor Fox is well qualified for his teaching position here at George Washington. He taught soil mechanics and structures for four years at Northwestern University. In addition, he has taught graduate courses in soil mechanics at the University of Southern California. This semester he is teaching CE courses including reinforced concrete, hydraulic engineering, and strength of materials.

Professor Fox is a member of several professional societies including American Society of Civil Engineers, American Society of Testing Materials, American Society of Engineering Education, Highway Research Board, and the U. S. National Council for Soil Mechanics and Foundation Engineering.

His very active life leaves little time for activities outside of engineering, but he does enjoy photography and golf. He has a wife, Shirley, and three children, Kathleen, 7; Michael, 5; and Brian, 3 months.

RCA Electronics creates the "501" to streamline the paper work of business—it reads, writes, figures and remembers on tape

Much of today's traffic jam in paper work is being eliminated by electronic data processing. But to build a system that would be practical and economical for even medium-sized organizations was a job for electronic specialists.

To solve the problem, RCA drew on its broad experience in building computers for military applications and combed its many laboratories for the latest electronic advances that could help. The result was the RCA "501" high-speed electronic data processing system—the most compact, flexible, and economical ever built. It is a pioneer system with all-transistor construction for business use.

The "501" cuts out paper work bottlenecks for many government agencies and businesses, from stock brokerage firms to public utilities, banks, insurance companies, and steel mills.

It "remembers" millions of letters, numbers, and symbols that are "read" onto its magnetic tapes by such things as punch cards and paper tapes. In a fraction of a second, it can do thousands of calculating, sorting, and comparing operations—and checks each step. Finally, it writes such things as bills, reports, payrolls in plain English at 72,000 characters per minute.

This economical and practical answer to an acute business problem is another way RCA Electronics is helping to simplify the growing complexity of business.

RADIO CORPORATION OF AMERICA

A Case for Academic Honesty

by L. A. RUBIN

The recent Congressional hearings into T·V quiz shows, and especially the revelations of rigging and dishonesty by Charles Van Doren have resulted in an upheaval of some of the traditional beliefs about college professors.

Some people have held the view that a professor is indisputably honest in all respects. Others hold that in intellectual and moral values, at least, college teachers are without doubt very honest. Although the atmosphere varies with the faculty, student body, and locale, it is a general concept among students that their professors try to be intellectually, and therefore generally, honest. It is true that one of the ingredients of good teaching in the past was the complete confidence of the students in their teachers. To have a small amount of honest distrust of the teacher was good or bad depending on whether the teacher was expounding on Shakespeare or on Ohm's Law.

Although effective teaching depends a great deal on the teacher-student relationship, it is not clear to what extent the students' faith in the teacher's honesty affects the overall educational picture.

My concept of education is embodied in the belief that the student really teaches himself. The role of the professor is that of a stimulator and counsellor. However, if the student feels that the professor is in any way dishonest in his dealings with students, the only really effective teaching mechanism available to the professor may indeed be lost.

In engineering, the student learns to live with a set of indisputable laws of nature. He learns that to disregard or disobey these laws results in catastrophic failure in all cases. In human relations too, the student must recognize a set of laws which must be faithfully obeyed as a means to a successful, harmonious, and happy life.

It is my belief that engineering students are quite fortunately situated in a world of such diverse values. On one side we find the stoic philosophy of the "Beatnicks". On the other side one sees the very epicurian way of our society. In his attempt to find his own "value judgment" the engineer is faced by many dilemmas and pressures. Should one join a social fraternity? Should one cheat on exams? Should one distort the facts in a job interview? Should one seek the highest paying job? Should one marry the boss' daughter? A great variety of such questions will be posed in the life of every student. They must be answered by the individual on an individual basis.

In the education of engineers then, the professor finds himself trying to impart two almost divergent philosophies. On the one hand, he must give the student an appreciation of the natural physical laws, and on the other hand he must try to equip the student with the maturity to solve the problems involving the laws of society.

One can argue that we are doing the engineer an injustice by making him live by this double standard. We recognize that he must live both by physical and social law and we try in our educational program to resolve this by preparing the student in both areas. We make no pretense of trying to change society or the person through legislation; rather do we hope to improve society and the person through education.

All-weather auditorium in Pittsburgh will be covered by a 415-foot diameter Nickel-containing stainless steel dome. Largest of its kind in the world, the dome will protect an audience of more than 13,000.

For Pittsburgh's new auditorium...

A "push-button umbrella roof" of Nickel stainless steel ...the roof design of tomorrow

Here's the first of a revolutionary new type of roof design, destined to introduce a new concept in building.

A simple concept, but a daring one. The domed roof of a building is divided into eight sections which nest together when opened. Push a button, and six of these sections glide quietly together around an outside track.

In Pittsburgh's new all-weather auditorium, the push-button umbrella roof can be closed at the first sign of bad weather without disturbing the show. In private homes, a roof design like this could bring the beauty of nature right into the home.

But what material is lasting enough for a dome like this? Architects and designers of the auditorium looked into all types of materials. They selected Nickel-containing stainless steel. They selected Nickel stainless because it has the best combination of properties for this purpose. For example it is one of the most weather-resisting, corrosion-resisting metals.

Naturally, this is just one example of how designers are taking advantage of the unique properties of Nickel-containing metals. In the future, however, you may be designing a machine—not a spectacular all-weather push-button roof. You might need a metal that resists corrosion, or wear, or high temperatures. Or one that meets some destructive combination of conditions. Here, too, a Nickel-containing metal could be the answer.

But, whatever your field of study, in the future you can count on Inco for all the help you need in metal selection. Right now, if you'd like to get better acquainted with Nickel Stainless Steel, why not write Inco for "Stainless Steel in Product Design." Write: Educational Services, The International Nickel Company, Inc., New York 5, N. Y.

Inco Nickel *makes metals perform better, longer*

What's New?

According to a report from Illinois Institute of Technology the total engineering enrollments in the nation last year dropped 2.4% over 1957 totals. However, upward trends in graduate study in engineering were maintained in 1957 and 1958.

A poll of deans of engineering indicated that the drop in freshman engineering students was attributed to three factors: 1) Mistaken appraisal of the long-range opportunities in engineering by counselors, students and parents; 2) Increased concern about the rigors of engineering education; 3) Increased interest in other scientific fields as the result of publicity given developments in atomic and space research.

However, as the need for engineers is increasing, maximum effort on the part of government, industry and education must be made to atract qualified youths, boys as well as girls, to careers in engineering.

* * *

NEW STAINLESS STEEL ALLOY

A more efficient method of fabricating more than 100 feet of stainless steel tubing used in jet aircraft anti-icing systems is possible because of the inherent qualities of the AM-350 stainless steel of which the tubing is made.

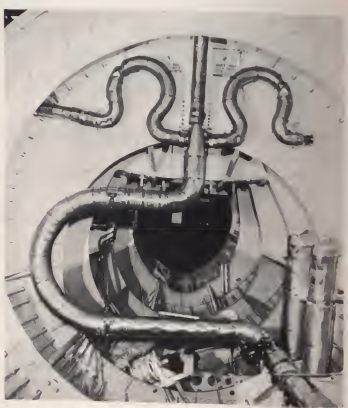
The new technique is employed in fabricating the tubing ducts for the anti-icing system of the Lockheed turboprop Electra. This new stainless steel alloy was developed by Allegheny Ludlum Steel Corp. for the aircraft industry.

The use of AM-350 eliminates the need for separate elbows and joints because it can be bent to the desired degree. Its high strength-to-weight ratio at high temperatures permits minimum weight for carrying hot bleed-air from the engine to wing and tail surfaces.

After the metal has been fabricated it is process-annealed and then treated at sub-zero temperatures to provide maximum strength and hardness.

The ducting of the anti-icing system must withstand heat of about 700 degrees F. and pressures of up to 200 pounds per square inch. The gauges range from .025 to .187, and the outside diameters of the ducts are from one-and-one-half inches to four-and-one-half inches.

* * *



Bleed air duct in the tail section of Lockheed's Electra illustrates the complex configurations AM-350 tubing can take.
Courtesy: Alleghany Ludlum Steel Corp.

The silicon carbide crystal of the "transistorized" tube is inside the cartridge being inserted into the tube.
Courtesy of Westinghouse Electric Corp.

TRANSISTORIZED ELECTRONIC TUBES

A new era in the history of electron tubes might be just beginning. A discovery disclosed by Dr. Clarence Zener, director of Westinghouse research, will make possible the construction of "transistorized" electronic tubes. Certain semiconductor materials yield a constant flow of electrons, and the density of the electron flow is equal to that in the average electronic tube. The latest semiconductor to exhibit that property is silicon carbide—a hard, crystalline solid best known for its widespread use in impure form as an abrasive in grinding wheels.

In the new application of the semiconductor materials, the heated cathode would be replaced by a small semiconductor crystal having a built-in "junction" like that in a transistor. The crystal would consume a negligible amount of power and would yield electrons instantly and indefinitely when a small electric voltage is applied across it.

The escape of electrons from silicon carbide accompanies the emission of visible light from the crystal. This visible light is a form of electro-luminescence, and occurs when enough voltage is applied across the junction to cause breakdown.

When breakdown occurs, small blue spots of light appear in the crystal in the region of the junction. The diameter of those spots is only about 50 millionths of an inch. Currents up to one millionth of an ampere have been measured at the spots. This density of electron flow is comparable to that from the cathode of a typical electronic tube.

Since the flow of electrons originates from a pin-point source, focusing of the electron beam would be simplified and much of the complicated tube construction would be eliminated.

This discovery will find many applications in the field of miniaturization by eliminating the hot, power-consuming cathodes.

* * *

COMPUTORS AND MEDICINE

In the fight against heart disease a powerful new tool is being added. High-speed digital computers will help a physician make an objective diagnosis of his patient.

A method developed by the National Bureau of Standards uses computers to compare and analyze heartbeat information. Heartbeat data are recorded on magnetic tape, and these records are compared by a high-speed digital computer. The advantage of the magnetic tape is that large amounts of data can be stored in a form suitable for comparison much later. The analysis of large number and variety of heartbeat records will aid heart study.

Since the data must be fed into the computer in a digital form, the electrocardiograms are changed to numerical form, and then resulting numbers are recorded on another magnetic tape. These numbers, representing electrical signals associated with the heart beat, can be compared with a normal record for diagnostic purposes, or with various factors among groups of patients for statistical purposes.

An electrocardiogram is a series of three continuous waveforms, substantially repetitive with each heartbeat. These waveforms approximate the three mutually perpendicular components of the heart vector, as obtained from elec-

Typical heartbeat waveforms.
Courtesy of National Bureau of Standards

trodes placed on the head, chest, and ankle of the patient.

The analog tape recording (electrocardiogram) contains 10 or 12 heartbeats on three FM channels, and the patient's identification on one voice channel. Wide-deviation FM was chosen for recording the hearbeat signals because the frequencies to be studied fall between d.c. and 200 cps. The three signals are displayed simultaneously on an oscilloscope, and the display is independent of the heart rate. Normally only one cardiac cycle is converted to digital form for analysis. However, when the heartbeats appear erratic, more than one cycle may be recorded.

A converter samples each of the three analog waveforms 1000 times per second, and it represents the magnitude of each wave at the time of sampling by a binary number. Approximately 1,000 cardiac cycles can be recorded in this manner on one reel of digital magnetic tape.

This method is already being used by the Veterans Administration researchers. In the future, high-speed digital computers should prove a powerful tool for the study of heart diseases.

* * *

EDUCATIONAL TELEVISION

The urgent need for providing better education to a larger number of students has led to a development of a new educational experiment: airborne television instruction.

Classroom courses taught by outstanding teachers will be put on video tape and televised from a DC-7 aircraft at a height of some 20,000 feet. The range of these telecasts will be a circle 300-400 miles in diameter, reaching from Milwaukee and Detroit to Cincinnati and Louisville. Approximately 5,000,000 students and 13,000 schools and colleges are participating in this experiment.

Programs will be transmitted from ground based facilities at Purdue University in Lafayette, Indiana, to the circling aircraft some distance away and re-telecast to the participating schools.

The use of an aircraft in broadcasting television programs has been proved feasible through the "Stratovision" experiment conducted by Westinghouse Electric Corporation soon after World War II. At that time an airborne transmitter operating at 25,000 feet delivered a satisfactory signal to receiving sets as far away as 225 miles, when terrain conditions were favorable.

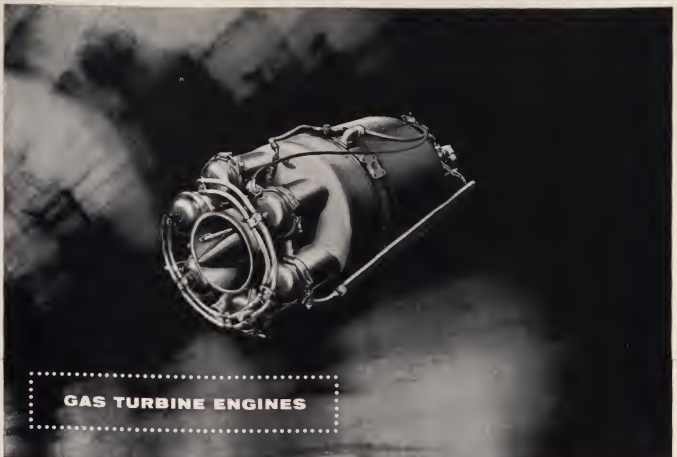
In order to conserve channel space the "narrow-band" television developed by CBS Laboratories will be used. With this new method a good quality video image may be broadcast within a 3 megacycle bandwidth instead of the conventional 6 megacycle band. The "narrow band" system uses scanning standards which differ from those used for conventional broadcast television. Picture tubes with a longer decay phosphor make possible the use of lower field rates. An important limitation of the "narrow band" method is that the signal cannot be satisfactorily received on conventional home sets, thus confining reception to schools equipped with new type receivers.

An airborne TV system transmitting six simultaneous programs could provide 72 separate half-hour units during a six-hour school day.

Airborne television can provide, for the first time, an efficient means by which new educational developments, experimental results and important research findings can be quickly communicated to professional educators in all school systems. It can also afford good instruction in schools which cannot provide a full curriculum and hire enough teachers.

The initial cost of this program will be high, but in the long run the economic implications of a well-developed airborne system are highly favorable, since the costs would be spread over a large number of students.

Modified B-29 bomber used for the Westinghouse "Stratovision" experiment.



• The small gas turbine is an important aircraft support item used primarily for starting jet engines and providing on-board auxiliary power. The high compressed air and shaft outputs for its small size and weight mark it as an important power source for common commercial use. AiResearch is the largest producer of lightweight gas turbines, ranging from 30 H.P. to the 850 H.P. unit pictured above.

EXCITING FIELDS OF INTEREST FOR GRADUATE ENGINEERS

Diversity and strength in a company offer the engineer a key opportunity, for with broad knowledge and background your chances for responsibility and advancement are greater.

The Garrett Corporation, with its AiResearch Divisions, is rich in experience and reputation. Its diversification, which you will experience through an orientation program lasting over a period of months, allows you the best chance of finding your most profitable area of interest.

Other major fields of interest include:

• **Aircraft Flight and Electronic Systems**—pioneer and major supplier of centralized flight data systems and other electronic controls and instruments.

• **Missile Systems**—has delivered more accessory power units for missiles than any other company. AiResearch is also working with hydraulic and hot gas control systems for missile accessory power.

• **Environmental Control Systems**—pioneer, leading developer and supplier of aircraft and spacecraft air conditioning and pressurization systems.

Should you be interested in a career with The Garrett Corporation, see the magazine "The Garrett Corporation and Career Opportunities" at your College placement office. For further information write to Mr. Gerald D. Bradley...

THE GARRETT CORPORATION

AiResearch Manufacturing Divisions

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Systems, Packages and Components for: AIRCRAFT, MISSILE, NUCLEAR AND INDUSTRIAL APPLICATIONS

CAMPUS NEWS

AWARDS

The following students are recipients of an American Nuclear Society student award given in conjunction with the Society's 1959 Winter Meeting on November 6, 1959, in Washington. The awards are given on demonstrated ability and interest in the field of nuclear engineering and nuclear science. Students receiving the awards will participate in technical sessions, technical film presentations, a luncheon and a plant tour at Fort Belvoir, Virginia as guests of the American Nuclear Society.

Students from the School of Engineering receiving these awards are as follows:

Wayne A. Davis—BSE Feb. '60
Albert R. Howland, Jr.—BEE '60
John W. Roberts—BME '60
Jack A. Petrick

ENGINEERS' COUNCIL

The positions on the Engineers' Council which were previously vacant have now been filled. The new representatives are: Ed Cutler, Sigma Tau; Bob Moore, Graduate; Bill Duff, Graduate; and Harvey Platt, Sophomore Class.

The Council assisted the faculty Family Day committee in arranging, preparing, and presenting the annual Family Day program. The informative program was seen by far too few parents, students, and friends of the school.

With particular regard to the graduating seniors, the council is working very closely with the G W U Placement Office. Company literature will be available in the D-H House and Room M-4 of Tompkins Hall. Sign-up sheets for interviews will be placed in the D-H House after all the interested seniors have had an initial interview with the Placement Officer, Mr. Reilly.

A. S. C. E.

The regular monthly meeting of the student chapter was held on Wednesday, November 4, 1959 in room 201 of Tompkins Hall. The program featured a short business meeting followed by a discussion centered on the construction of highway bridges.

The business meeting was highlighted by the Treasurer's report that showed chapter financial assets approaching absolute zero. An appeal is being made to all members and eligible members to please pay their fall dues promptly. Also, the desirability of a student paper on some civil engineering subject was discussed. It was pointed out that any C. E. student who has any subject on which he has prepared a paper, or on which he could prepare a paper, should submit such paper to the chapter promptly. Discussed also during the business meeting was the method of competitive evaluation of the student chapter based upon the annual report submitted by the chapter. This item has been referred to the Executive Committee to be brought up for further discussion at the regular December meeting.

Following the short business meeting, the floor was turned over to Mr. Carl A. Wilson, P.E. who currently is engineer of bridge construction and maintenance for the D. C. Department of Highways. Mr. Wilson was assisted by Mr. Frank Den Outer who is a supervisory engineer with the D. C. Department of Highways.

These two gentlemen led the chapter into a most interesting, informal discussion regarding bridge construction. The discussion by Mr. Wilson and Mr. Den Outer was factually supplemented by color slides of bridge construction projects located in and around the D. C. area.

It is worth metioning that our student chapter was represented well during the discussions by the comments and clarifications offered by "Jake" Lemair and Vladimir Saba. Mr. Lemair is a senior member of the chapter and Mr. Saba is a graduate student. Both are employed by the D. C. Department of Highways and many of the "jobs" illustrated by the slides were familiar to these two chapter members and encouraged many enlightening comments from them.

The formal program was completed at approximately 10 P. M. At this time the membership mingled with the guests over some refreshing coffee and pastries.

It might be noted that of 80 or so C. E. students enrolled at G.W.U. only about 20 were present at this meeting. As a matter of fact, it was pointed out that the guests present out-numbered the chapter members. This is a problem that chapter officers devotedly have tried to solve, but have failed up to this time. We only hope that those of you who could not possibly be at our meeting will at least come to one meeting and let us know why you cannot be with us; maybe your chapter can help improve the situation. To repeat, out of a possible 80 we had about 20 present at our November meeting—not good indeed.

The highway bridge program is to be

supplemented by a field inspection trip to notable projects currently under way. Attention is directed to posters containing complete information regarding this event. These posters will be found on convenient bulletin boards located in Tompkins Hall.

Regular ASCE Meeting
Wednesday, December 2, 1959
Tompkins Hall, Room 201
Refreshments Served

THE ME CORNER

The regular meeting of the American Society of Mechanical Engineers was held on November 4, 1959 in room 205 at 8:30 pm, and was called to order by Dave Anand (the chairman on crutches, nursing a broken foot). The meeting was a big success. The attendance (we daresay for the first time) was excellent and a few late comers were perturbed by the thought of not finding enough seats.

The routine formalities were dispensed with first, and then various new topics were brought up for discussion. The members were requested to give suggestions for having better programs. (This immediately brought forth response.) Everyone decided to continue to recruit more members and try for a big turn out next time. Then everyone agreed to hold the meetings at 8:15 pm instead of the previous agreed upon time of 8:30 pm.

The members then viewed the movie "TO ENRICH MANKIND" specially made by the ASME. This movie illustrates a few of the many activities present Mechanical Engineers are engaged in.

The meeting was adjourned at 10:00 pm after the usual cool cider and hot donuts!

IRE-AIEE

The monthly meeting of the Joint Student Branch, IRE-AIEE, was held Wednesday, November 4, 1959. Leon Sibul, President of the Joint Student Branch, made public a letter from Kitt Gillilland, Technical Director, WRGW Radio Workshop, requesting the Branch to assume responsibility for the technical engineering aspects of the University radio station, WRGW. Conveying a spirit of interest in University projects, the Branch decided to thoroughly investigate the feasibility of such participation.

An informative lecture was given by Mr. Michael F. Bondy on RCA's participation in the Army Micro-Module Program. Mr. Bondy stressed that this program constitutes a new *concept* in the construction of electronic equipment, rather than merely another new technique. Although density of packaging is not the prime aim of this program, the Micro-Module has a package density of 6×10^5 parts/ft.^{3}. Mr. Bondy compared this with what is considered the ultimate in package density—the human brain—which is said to have a density of 10^{11} parts/ft^3.

In addition to high package density and the resulting size reduction, the objectives of the Micro-Module concept include the search for easier maintenance methods, significant cost reduction, versatility for all low-power applications, improved performance and greater reliability, and uniformity of size of micro-elements for use in the modules. Uniformity of size has been achieved by standardizing each micro-element to 0.301 in. square and 0.010 in. thick. Maintenance methods for equipment using Micro-Modules consist of checking and replacing entire circuits, rather than separate elements, as is now necessary. Great strides are also being made in developing new applications as well as in increased performance and reliability, but at this time the cost is prohibitive for commercial use. Mr. Bondy explained that one of the problems that is constantly being studied is a means to mass produce the modules to make them readily available for use in the defense effort, and, eventually, for use in consumer goods. To illustrate the potentialities of the use of modules for consumer goods, he demonstrated two radios built of Micro-Modules. One was the size of a socially unacceptable bachelor's address book and the other, on display in a plastic enclosure, could easily be housed in a structure scarcely larger than a fountain pen.

Mr. Bondy, who graduated from George Washington University with a Bachelor of Electrical Engineering Degree in 1943, became nostalgic early in the lecture and recalled attending a class at GWU during the Second World War. His instructor was "Colonel Ames". After the lecture Mr. Bondy and Deacon Ames, now faculty adviser for the IRE-AIEE, reminisced about the class and other members of it who are now working in various parts of the United States. Dr. Ames seemed justly proud of "his boys".

The next meeting of the Joint Student Branch, IRE-AIEE, will be held December 2. Mr. Myron Moore will lecture on High Voltage Power Transmission. Be sure to watch the bulletin board for the meeting notice, and remember that members and non-members alike are invited to attend.

THETA TAU

Theta Tau held its founders day Banquet and Ball on November 7 at the Arva Motor Hotel in Virginia. At this affair seven newly initiated members terminated their pledge duties by presenting a skit during intermission. The skit mocked TV commercials such as

"The Living Bra" demonstrated by dancing "girls" and "Gardol Protection," demonstrated by a shot-put "artist." The new members are as follows: Wes Harris, Don McChesney, Floyd Matthews, Ray Morales, Ed Walker, Frank Weisman, and Herb Wilkinson.

The guest speaker for the evening was Mr. George Lohnes, part owner of the Lohnes-Culver consulting firm in Washington, D. C. Mr. Lohnes said that the graduate engineer should be looking for work and not for a job. When the student is hired he will become part of a team. This green employee will not be given responsibilities he cannot shoulder and must advance by his own initiative and drive. It is realized that this young engineer will make mistakes, as all of us will, but he must be able to recognize them, learn from them, and not make the same mistake again. In concluding, Mr. Lohnes said that the young engineer should use engineering judgement. That is, he should get all the facts and then apply common sense in making his decision.

Among the guests present were Mr. and Mrs. Ames and Mr. and Mrs. Cruickshanks. Prof. Cruickshanks is an honorary member of Theta Tau and a familiar face at all the fraternity functions. Deacon Ames is the advisor and founder of Gamma Beta Chapter.

* * *

Theta Tau's annual shrimp feast was held on Wednesday, November 11, at Deacon Ames' "back-acre" in Westmoreland Hills, Md. The shrimp were cooked on an open fire under the direction of Theta Tau's chief chef Spencer. Hot dogs and liquid refreshments were also to be had. While some helped consume the 30 pounds of shrimp, others sharpened their appetite by playing football. The fine weather encouraged a good turn out by both undergraduates and alumni.

Wisdom: Knowing what to do.
Skill: Knowing how to do it.
Virtue: Not doing it.

GLOBETROTTING ENGINEERS

(Continued from page 9)

needed? A more direct approach would be to contact the large corporations which have extensive operations abroad Many of them have training programs to prepare you for overseas work so that you can be self-sufficient and secure in the knowledge that is required of you, before leaving home. This last remark should not suggest that your education must cease once you leave home. Far from it. Aside from the obvious aspect of absorbing foreign cultures and languages there is much to be learned from a study of foreign technology. Formal education need not stop either, though it might become a bit piece-meal.

So those of you who agree with me that field engineering is the thing—I'll be looking for you in Pago-Pago.

Don't step back! Establishing a line of position in the far-northern latitudes. The sun shines all summer long up here, so there is no chance for a star shot.

Corner reflector antenna erected by Page Engineers in the Pacific Ocean area. The array is designed for transmit and receive simultaneously. It is important in an antenna of this type to prevent arcing caused by high power in the transmitting array. Such arcing could completely block out the receive signal.

PLACEMENT INTERVIEW SCHEDULE

DATE	ORGANIZATION	INTERVIEWING	INTERVIEW ROOM	INTERVIEWER	REMARKS
Nov. 24	Ravere Copper & Brass Co. Baltimore, Md. & elsewhere	BSE ME CE Bus Adm w/semi Technical bckgd Liberal Arts (BA)	2114 G St	*(Subj to change)* Mr. Weaver	Copper, brass, and aluminum products. Positions are for Industrial Technical Advisors, Architectural Technical Advisors, & Industrial Sales, Training.
Nov. 25	Pan American Union—US & SA	Economists Others	2114 G St	Mr. Nimo	MORE INFORMATION LATER. SEE BULLETIN BOARDS.
Dec. 1	Scope, Inc Washington area	EE ME	M4—Tompkins		MORE INFORMATION LATER.
Dec. 2	Baltimore & Ohio RR, Baltimore, Md.	CE ME EE BSE (also CE for summer)	2114 G St		Technical graduate Training Course; 2 yrs rotational tng program to prepare for supervisory positions in technical and operational departments.
Dec. 2	Dow Chemical Co. Williamsburg, Va. area & elsewhere	EE ME Chem Stat Math (w/some Stat)	M4—Tompkins	Mr. Bowler	Interviews primarily for the synthetic fibres division. Will also interview people specifically interested in DOW. Must be in top ⅓ of class.
Dec. 3	Naval Proving Ground	Engr & Science	To be announced		MORE INFORMATION LATER.
Dec. 3	Bendix-Aviation, Eclipse-Pioneer Division, Teterboro, New Jersey	EE ME	M4—Tompkins	Mr. Sharp or Mr. Nordstrom	Research, Development, Design, Test, Production and Sales in Electrical, Electronic, Mechanical, Pneumatic, Hydraulic, and Aeronautical Engineering. Automatic Pilot and Flight Path Control Equipment, Stabilization Equipment, Precision Components for Servo-Mechanism and Computing Systems, Flight and Navigation Instruments, Inertial and Missle Guidance Systems.
Dec. 3	Upjohn Company Home Office in Kalamazoo, Mich. Positions in various places, mainly Metro DC.	BA; major in Pharmacy, Pre-Med, Biologicals, Chem, Bacteriology, Physiology, Pharmacology, or a combination of minors in the above. Also: Physical Education	2114 G St	Mr. Whiteley	Salaried Pharmaceutical Sales. Not over 30; Car. Males. IF INTERESTED IN NON-SALES SCIENTIFIC RESEARCH POSITION, SEE PLACEMENT OFFICER.
Dec. 4	Radio Corp of America Various Locations	EE Physics Math Top ⅓ of class. All degree levels	To be announced		Research & Development; Sales; Manufacturing, Various locations. If interested, sign up now. Training programs.
Dec. 4	Cleveland Pneumatic Industries Washington, DC.	ME Engr Physics Applied Math	2114 G St	Mr. Mack	Activities are in solid fuel rocket components, underwater ordinance devices and hydrodynamic devices.
Dec. 8	US Steel Corp Home Office in Pittsburgh, Pa. Various Locations	EE ME CE Chem E IE BSE MSE MEA All levels All types of Engr	M4—Tompkins others, too	*(Subj to change)* R. M. Lewis W. A. Sech	R & D, Manufacturing, Design, and Sales in Steel and allied products. Primarily interested in men for the areas of production and staff work.

DATE	ORGANIZATION	INTERVIEWING	INTERVIEW ROOM	INTERVIEWER	REMARKS
Dec. 9	Bethlehem Steel Bethlehem, Pa. Various Locations	Engineers (all types) Bus Admin (w/Engr bckgd) Accountants Industrial & Public Relations (top 10%)	M4—Tompkins		Steel Plant Operations, Fabricated Steel Construction, Research, Shipbuilding, Mining, Sales, Accounting, Loop Course; Basic specialized and on job training.
Dec. 9	National Aeronautics & Space Administration	Engineers	2114 G St		R & D .MORE INFORMATION LATER.
Dec. 10	Equitable Life Assurance Society, Washington, DC	Business Administration Liberal Arts	2114 G St		Insurance Sales.
Dec. 11	NORDEN Division of United Acft Corp White Plains, NY	EE ME Physics	To be announced		R. & D. in Radar & Communications, Missille Systems, Navigation Systems, Weapons Systems, Digital Data Processing, Analog Computors, Stabilization & Navigation, and Television & Passive Detection.
Dec. 11	Jansky & Bailey, Inc. Washington, DC	EE ME Engr Physics	M4—Tompkins	Mr. Kube	Local, For Antenna Design, Circuit Design, Communications Engineering (interference control problems w/receivers, transmitters, modulation techniques, antennas and terminal equipment), Instrumentation. Educational Assistance.
Dec. 14	Johnson Service Company Washington, DC	ME	To be announced		Mechanical Engineers for Sales of Heat Regulator Equipment in the Metro DC area. Salaried. Prime producers of regulators.
Dec. 16	Philco Corp Philadelphia, Pa.	EE ME Engr Physics	M4—Tompkins		R & D. Design, Production, and Field Engineering in Radar Systems, Missile Systems, Television, Microwave commo design, various consumer products, Etc. Various locations.

SLIPSTICK SLAPSTICK

A kiss: A mouth full of nothing that tastes like heaven and sounds like a cow pulling her foot out of the mud.

* * *

CE: "What's the best way to keep a horse from frothing at the mouth?"
BSE: "Teach it to spit!"

* * *

Grandma Jones had lived alone in her spinster's cottage for many, many years. She seldom ventured further than the front gate and that was only to get mail. She seemed, however, to enjoy her life of solitude.

"But how do you stand the everlasting silence, Grandma?" asked a neighbor one day.

Grandma looked fondly at the two kittens that were playing with a ball of twine on the floor. "Oh," she said with a playful gleam in her eye, "when it gets so quiet that I can't stand it any longer, I just kick the hell out of one of the cats."

* * *

Two G. W. medical students got bored at the hospital the other day. They found a stack of diagnosis cards and began a game of poker. They picked up their hands and looked at the cards. One bet, the other raised and reraised until one finally called.

"Looks like I win. I've got three pneumonias and two gallstones."

"Not so fast, I've got four enemas."

"Well, I guess you take the pot."

* * *

A young fellow once took his dainty grandmother to see the road show tour of "Tobacco Road." After the first two profane acts, the little old lady was groping under her seat.

"What's the matter, Grandma?" asked the boy.

"Oh," she said, "I've lost my g---damn program."

Jack and Jill went up the hill
Upon a midnite ride;
When Jack came back
One eye was black . . .
You see, his pal had lied!

* * *

He: "Are you afraid of the big bad wolf?"
She: "No, why?"
He: "That's funny. The other three pigs were."

* * *

Dogs in Siberia are the fastest in the world because the trees are so far apart.

* * *

I think that I shall never see
A girl refuse a meal that's free;
A girl whose hungry eyes aren't fixed
Upon a drink that's being mixed;
A girl who won't forever wear
A bunch of junk to match her hair;
A girl who looks at boys all day
And figures ways to make them pay.
Girls are loved by jerks like me,
'Cause who would want to kiss a tree.

* * *

All a sweater does for some coeds is make them itch.

* * *

ME: "I cured my child of biting his nails."
EE: "Oh, yes? How?"
ME: "I kicked his teeth out."

* * *

To kill halitosis
Try chlorophyll gum
It turns your teeth green
But it tastes better than Mum.

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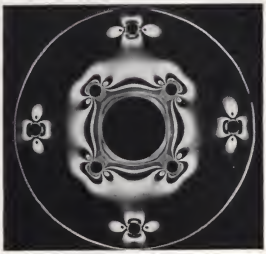

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One of a series*

Interview with General Electric's
Charles F. Savage
Consultant—Engineering Professional Relations

How Professional Societies Help Develop Young Engineers

Q. Mr. Savage, should young engineers join professional engineering societies?

A. By all means. Once engineers have graduated from college they are immediately "on the outside looking in," so to speak, of a new social circle to which they must earn their right to belong. Joining a professional or technical society represents a good entree.

Q. How do these societies help young engineers?

A. The members of these societies —mature, knowledgeable men— have an obligation to instruct those who follow after them. Engineers and scientists—as professional people—are custodians of a specialized body or fund of knowledge to which they have three definite responsibilities. The first is to *generate* new knowledge and add to this total fund. The second is to *utilize* this fund of knowledge in service to society. The third is to *teach* this knowledge to others, including young engineers.

Q. Specifically, what benefits accrue from belonging to these groups?

A. There are many. For the young engineer, affiliation serves the practical purpose of exposing his work to appraisal by other scientists and engineers. Most important, however, technical societies enable young engineers to learn of work crucial to their own. These organizations are a prime source of ideas — meeting colleagues and talking with them, reading reports, attending meetings and lectures. And, for the young engineer, recognition of his accomplishments by associates and organizations generally heads the list of his aspirations. He derives satisfaction from knowing that he has been identified in his field.

Q. What contribution is the young engineer expected to make as an active member of technical and professional societies?

A. First of all, he should become active in helping promote the objectives of a society by preparing and presenting timely, well-conceived technical papers. He should also become active in organizational administration. This is self-development at work, for such efforts can enhance the personal stature and reputation of the individual. And, I might add that professional development is a continuous process, starting prior to entering college and progressing beyond retirement. Professional aspirations may change but learning covers a person's entire life span. And, of course, there are dues to be paid. The amount is graduated in terms of professional stature gained and should always be considered as a personal investment in his future.

Q. How do you go about joining professional groups?

A. While still in school, join student chapters of societies right on campus. Once an engineer is out working in industry, he should contact local chapters of technical and professional societies, or find out about them from fellow engineers.

Q. Does General Electric encourage participation in technical and professional societies?

A. It certainly does. General Electric progress is built upon creative ideas and innovations. The Company goes to great lengths to establish a climate and incentive to yield these results. One way to get ideas is to encourage employees to join professional societies. Why? Because General Electric shares in recognition accorded any of its individual employees, as well as the common pool of knowledge that these engineers build up. It can't help but profit by encouraging such association, which sparks and stimulates contributions.

Right now, sizeable numbers of General Electric employees, at all levels in the Company, belong to engineering societies, hold responsible offices, serve on working committees and handle important assignments. Many are recognized for their outstanding contributions by honor and medal awards.

These general observations emphasize that General Electric does encourage participation. In indication of the importance of this view, the Company usually defrays a portion of the expense accrued by the men involved in supporting the activities of these various organizations. Remember, our goal is to see every man advance to the full limit of his capabilities. Encouraging him to join Professional Societies is one way to help him do so.

Mr. Savage has copies of the booklet "Your First 5 Years" published by the Engineers' Council for Professional Development which you may have for the asking. Simply write to Mr. C. F. Savage, Section 959-12, General Electric Co., Schenectady 5, N. Y.

***LOOK FOR other interviews discussing: Salary • Why Companies have Training Programs • How to Get the Job You Want.**

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